

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATIONS**

FISHPOND MANAGEMENT

**(acre)
CODE 399**

POND CONSTRUCTION

To produce adequate amounts of harvested fish, a pond or lake must be properly constructed. The pH of the soils in the bottom of the pond should be corrected to 7.0. For proper management, a water control pipe that releases deep water and retains surface waters should be installed. This pipe system should also have drawdown capabilities. See practice standards and specifications for Pond (378) for more information.

For effective management, ponds less than one acre are best suited for channel catfish. A farm pond that is to be stocked with bluegill and bass should be at least one acre in size, preferably larger. Although small ponds can normally provide unlimited bluegill fishing, the potential is great that bass will be overharvested in ponds less than one acre, allowing bluegill to overpopulate with many small fish. The goal should be the highest level of management to which a landowner will agree.

Stocking

Bass, Bluegill, and Redear Combination. Stock with hatchery produced fish. Stock a total of 400 bluegill sunfish and 100 redeared sunfish and 50 largemouth bass per surface acre.

Catfish, Bass, Bluegill, and Redear. With the regular bass, bluegill, redear combination, 50 channel catfish per acre may be added if desired. Bass and other predaceous fish will eat small catfish. Therefore, add catfish fingerlings only in new or renovated ponds. Do not stock catfish in combination with bluegills only, since catfish are not very efficient predators. The

bluegills will become overcrowded, resulting in poor growth of both species.

Catfish and Fathead Minnows. Channel catfish can be grown in farm ponds for sport fishing and home use. For unfertilized ponds without supplemental feeding, stock at 100 – 150 per acre. If the pond is kept fertile, stock up to 200 – 250 per acre. Producing catfish as a game fish is best done by using supplemental feeding. Stock 400 to 1,000 fingerlings per acre, depending on the frequency and amount of supplemental feeding.

To provide additional food and reduce need for pelleted food, stock fathead minnows at 1 to 2 lbs. per acre. Encourage fathead reproduction with pallets, cement blocks, tree limbs, and/or scrap lumber placed in water at least 3 feet deep.

Hybrid bream and bass. Stocking hybrid sunfish offers some attractive management possibilities in small ponds of 3 acres or less. Maximum growth can be attained by stocking 750 hybrids and 50 bass per acre, and then following a good fertilization program and feeding supplementally.

Sterile grass carp. Grass carp should be stocked in all new ponds as a weed preventive measure. Fingerling grass carp should be stocked at a rate of three to five per acre. In older ponds where bass are present, a minimum carp size of 8 inches will be needed. The stocking rate for older ponds will depend on the severity of the weed problem. Slight weed problems will require a stocking of five per acre. Severe weed problems may require a stocking of 12 or more per acre.

Crappie. Do not stock in farm ponds and small lakes as these fish are not adapted to such bodies of water and usually cause serious problems requiring complete pond renovation.

Liming

Waters ranging from a pH of 6.5 to 9.0 at daybreak are most desirable for fish production. Ponds constructed on acid soils will usually fall well below this level. These acid waters will be clear, infertile, and encourage the growth of aquatic vegetation. To avoid this undesirable condition in new ponds, disk in a minimum of 2 tons of agricultural limestone per acre before the pond fills. This should last for several years. To accurately determine the amount of lime needed, have the soil tested. In older ponds, a soil sample can be taken from the bottom of the pond or a water testing kit can be used to check for total alkalinity. If total alkalinity is less than 20 parts per million, add 1 to 2 tons of agricultural lime per acre. For best results, the lime should be evenly spread over the entire pond surface. Since lime takes about three months to react, autumn is usually the best time to apply.

Fertilization

1. Do not fertilize if:

- Pond water is muddy.
- Macrophytic plants are present.
- Channel catfish is the only predator fish and they are fed with commercial feed and/or fathead minnows.
- Fishing pressure on a bass/bluegill pond is not sufficient enough to justify time, effort, and expense of fertilization.
- Excessive amounts of water flow through the pond during the growing season (e.g. the water is removed and recharged in less than 30 days).
- Landowner is unable or unwilling to monitor pond's response to fertilizer and add more fertilizer as needed throughout the growing season.

- Total alkalinity of water is less than 20 ppm CaCO_3 .

2. Procedures

Liquid fertilizers are usually more cost-effective, faster, easier to apply, and with less waste than granular fertilizers. Of the three main elements in fertilizer, phosphorus is the most important, by far, for fish production. Nitrogen can provide some benefit, but potassium is usually not needed.

One gallon per acre of liquid super phosphate or triple super phosphate can develop a good bloom on many ponds with total alkalinity above 20 ppm CaCO_3 . But some ponds may benefit from fertilizer with some nitrogen in a combination that is mostly phosphorus.

Some experimenting may be needed to determine the most effective fertilizer blend for the given pond. Begin fertilizing when surface water temperatures stabilize in spring above 65°F.

Once fertilization begins in the spring, maintain adequate fertility throughout the growing season to prevent stress on and stunting of the fish.

Measure fertility of pond water (when not muddy) with a white disk that can be attached to a stick marked in inches up to 30. Depth at which the disk disappears in water is the measure of fertility or the degree of the phytoplanktonic bloom.

Table 1. Depth at which disk disappears (inches).

>24	Fertilize
18 – 24	Good bloom ~ fertilizer not needed
12 – 18	Dense bloom ~ watch closely
6 – 12	Bloom too dense, determine source, and prepare to aerate
<6	Oxygen shortage imminent

Supplemental Feeding for Channel Catfish

Commercial floating catfish feed (32 percent protein) may be fed 5 – 6 days per week when surface water temperature is between 70° and 90°F. Growth rates and stocking rates for catfish can be doubled when fed in this manner.

To avoid oxygen problems, do not feed on overcast, rainy, or very hot days. When water temperature exceeds 90°F, do not feed more than one or two times per week. Never feed more than 26 lbs. per acre per day unless dissolved oxygen is being monitored and emergency aeration equipment is at hand. Begin feeding (during growing season) enough floating feed that is consumed in 15 minutes. When fish have reached a desirable size for the pond owner, feed can be reduced to what they consume in five minutes.

Clearing Muddy Ponds

Control soil erosion entering pond by establishing appropriate perennial plant cover where needed.

Fence livestock out of pond and control their grazing where possible in adjacent pastures. Eliminate bullheads and common carp with rotenone.

When muddiness persists, one or more of the procedures below can help, depending on water quality.

1. For soft water ponds, especially where total alkalinity is less than 20 ppm: apply 1 – 2 tons per acre (depending on soil test of pond bottom) of agricultural limestone. This takes 2 – 3 months to take effect, but benefits can last for 3 or more years.
2. 35 to 50 lbs per acre of hydrated lime may precipitate the soil particles.
3. 20 lbs of granular or 1 gallon of triple super-phosphate (0-46-0) per acre (where total alkalinity is above 20 ppm) applied at 2 – 3 week intervals. Before applying: dissolve granules thoroughly in water or mix liquid fertilizer with 10 parts water.

4. 15 – 25 lbs of aluminum sulfate per acre. If pH of water is less than 7.0, add 50 lbs per acre of hydrated lime.

Managing Pond Fish Populations

1. General

Manage warm water pond fish populations by fishing and use of rotenone, as needed, to maintain a variety of age classes with good growth rates. Use fertilization or supplemental feeding (for channel catfish and bream) where desired to increase the pond's carrying capacity.

2. Harvesting

Do not harvest bass in newly stocked ponds until they have spawned (at least one year after stocking).

Do not return any species of bream to the pond after catching, except for bluegills and redears when most of these being caught weigh more than 0.5 lb. Then return only the smaller bluegills and redears.

The following guide is for use at ponds stocked for at least two years for bass and at least one year for sunfish and fishing is indicating no significant population problems.

Table 2. General harvest guide for bass-bluegill ponds.

Pond Fertility	Bass (lbs/ac/yr)	Bluegill (lbs/ac/yr)
Unfertilized, wooded watershed	10	40 – 80
Unfertilized, agric. watershed	25	100 - 150
Fertilized throughout	35	150 – 200

growing season

3. Analyses of Fish Populations

Check pond fish populations on a regular basis by analyzing catches from seine hauls and/or catches from sport fishing. Seine

hauls should be made in June or July using a

¼ inch mesh minnow seine 15 to 20 feet

Table 3. Status of Fish Populations Based on Fish Collected with Seine¹

<u>Contents of Seine</u>	<u>Status of Fish Populations</u>
1. Young bass present, many recently hatched bluegills.	Population balanced.
2. No young bass present, many recently hatched bluegills	Bass or bluegills crowded.
3. Young bass present, no recently hatched bluegills	Bluegills absent or undesirable species competing with bluegill.
4. No young bass present, no recently hatched bluegills.	Overpopulation of bluegills or undesirable fish species overpopulated.

Table 4. Status of Fish Populations Based on Fishermen's Catch¹

<u>Fishermen's Catch</u>	<u>Status of Fish Populations</u>
Bluegills average 6 to 7 inches in length. Bass average 1 to 2 pounds (12 to 15 inches in length).	Balanced.
Many small bluegills less than 5 inches in length. Only a few bass are caught and most of these are larger than 2 pounds.	Bluegills overcrowded and causing poor survival rate for young bass.
Few bluegills caught but those which are caught average greater than 0.4 pounds (7 ½ inches or greater in length). Bass average less than one pound.	Bass are overcrowded and causing a poor survival rate for young bluegill.
Excessive numbers of undesirable fish such as small crappie, green sunfish, bullheads, carp, or goldfish.	Species of fish present which are not compatible with bass, bluegill, and redear populations in farm ponds.
4. Correcting Population Problems Problems with fish populations arise from time to time in ponds. Common problems include: overpopulation of small bluegills, overpopulation of small bass, or undesirable species stocked purposely or accidentally. Sometimes it is necessary to eradicate the entire fish population and restock.	<u>Complete Eradication.</u> If needed, refer to the job sheet on retenuing a pond. This is necessary when unwanted species are present or when bluegills are so abundant as to stop successful bass spawning. <u>Seining.</u> In small ponds that have no stumps and other vegetation, an overcrowded bluegill population in its early stages may be corrected by seining. Use a seine 50 to 100 feet long with

¹ Revised from Pond Fish and Fishing in Illinois, by A.C. Lopinot, Fishery Bulletin #5, Illinois Department of Conservation, 1967.

½ inch mesh which lets small fingerlings remain. Throw back all bass and keeping-size bluegills, but destroy small and intermediate size bluegills. Seine at 10-day intervals until most of the intermediate size bluegills have been removed.

Drawdowns. By reducing the volume of water, bluegills and other sunfish are concentrated, allowing better control by predator fish. When the water level is down, the soil chemistry of the exposed bottom changes and much of the nutrient material locked up in the bottom muds is released and made available for next year's fish growth. Drawdowns also help control aquatic vegetation. Begin drawing down in fall and achieve maximum drawdown by late November. Draw the water down 2 to 4 feet in August, depending on the size and depth of the lake. Allow the water level to come back to normal by March 1st. This practice is especially applicable to larger lakes and will also work on smaller ponds.

Partial Kills. Overcrowding by intermediate-sized bluegills can often be corrected by a partial kill. Use one pint of 5 percent liquid rotenone per 300 linear feet of shoreline placed in a thin line about 20 to 25 feet from the water's edge. Do this between September 15 and October 15 on a clear, still and warm day between 11 a.m. and 2 p.m. Do not use in ponds less than 3 acres or on a windy day.

Selective Kills. Shad can be killed with rotenone or antimycin A with little harm to game fish. Very small amounts are needed, but accurate measurements and correct application methods are necessary.

Supplemental Bass Stocking. Supplemental stocking of 25 – 50 adult bass (1/2 pound and larger) or 100 – 300 bass fingerlings/acre can frequently correct overpopulations of bream and undesirable fish.

Oxygen Deficiencies. Oxygen deficiencies may occur during the spring and summer months, especially during the “spring turnover” (March and April) or during summer periods of hot, still, cloudy days. Ponds should be watched closely during such periods. The critical time of oxygen shortage is at daybreak. If fish are seen on the surface or otherwise showing distress, start remedial measures immediately. Use aeration equipment or a pump to lift surface water and spray it into the air and back into the pond. If fish are not surfacing in distress at daybreak, they are safe until the next daybreak, at least. Do not stir the water with a boat and motor as this further reduces the available oxygen in the surface layer of water and distributes it throughout the water column.

Aquatic Plant Control

First priority is to have the pond constructed so that water depths of less than three feet are minimized. Biological, mechanical, and chemical methods can be used in combination to control aquatic plants as they develop.

1. **Biological Control.** Grass carp can provide long term control on certain plants. Two to six inch grass carp can be stocked in new or renovated ponds, stock eight inch or larger carp in ponds with adult bass.

Grass carp prefer submerged succulent plants over fibrous plants as listed below.

Table 5. Some Feeding Preferences of Grass Carp*

<u>High</u>	<u>Moderate</u>	<u>Low</u>
Chara	Duckweeds	Eel Grass
Naiads	Pondweeds	Water meal
Hydrilla	Bladderwort	Cattail
Elodea	Fanwort	Milfoil
	Water pennywort	Parrot Feather
	Filamentous algae	Alligator Weed
		Spatardock
		Yellow Cowlily
		Torpedo Grass
		Watershield
		Waterlily
		Sedges

*From Georgia Cooperative Extension Service in Farm Pond Management for Recreational Fishing.

Grass carp are less efficient at controlling weeds as they grow over seven pounds. Replace them every five to seven years. Harvest by angling, snagging, or bowfishing.

2. Manual Control. Depending on available labor and equipment, weeds can be removed by pulling, raking, netting, seining, and pulling a drag line or chain across the pond bottom. Manual control is most appropriate and efficient in the early stages of weed development.
3. Chemical Control. Use herbicides as a last resort for weed control. Refer to the University of Arkansas Cooperative Extension Service publication MP44 — Recommended Chemicals for Weed and Brush Control for the current year. This

gives the legal and most effective herbicides with rates and precautions for the species to be treated.

Accurate identification of the plant species is critical for chemical treatments. Use of oxygen in the decay process of dead plants can kill fish in hot weather. Never use herbicides on more than one-fourth of the pond's surface area in warm weather. Avoid using herbicides at all in warm water ponds when air temperatures are over 90°F.

References

1. Ecological Sciences Reference Volume 1 – Pond Management, Wildlife Habitat Management, Streambank Restoration, Natural Resources Conservation Service, Arkansas.
2. Farm Pond Management for Recreational Fishing, Steven Killian, Mike Armstrong, John Hogue, Steve Lewis, Cooperative Extension Service Program, University of Arkansas at Pine Bluff and Arkansas Game and Fish Commission.
3. Fishpond Management, Conservation Practice Standard 399, Natural Resources Conservation Service, Mississippi, January 2000.
4. Pond Fish and Fishing in Illinois, A.C. Lopinot, Illinois Department of Conservation Fishery Bulletin No. 5, Springfield, Illinois, 1967.
5. Pond Management for Sport Fishing, Paul Brady, Soil Conservation Service, Little Rock, AR, 1981.